

What is claimed is:

1. A laminate flooring sub-layer material comprising:
inorganic fibers; and
plastic-containing bonding fibers;
said inorganic fibers and the plastic-containing bonding fibers being uniformly
blended and bonded together by a portion of the plastic of said plastic-containing bonding
fibers.
2. The laminate flooring sub-layer material of claim 1, wherein the laminate flooring
sub-layer material has a substantially uniform density throughout its volume.
3. The laminate flooring sub-layer material of claim 1, wherein the inorganic fibers
are scrap rotary fibers, virgin rotary fibers, scrap textile fibers, virgin textile fibers or a
combination thereof.
4. The laminate flooring sub-layer material of claim 3, wherein the rotary fibers
have an average diameter not greater than about 6 micrometers.
5. The laminate flooring sub-layer material of claim 3, wherein the rotary fibers
have an average diameter of about 2 to 5 micrometers.
6. The laminate flooring sub-layer material of claim 3, wherein the rotary fibers
have an average fiber length not greater than about 3 cm.
7. The laminate flooring sub-layer material of claim 3, wherein the rotary fibers
have an average fiber length between about 0.2 to 1 cm.
8. The laminate flooring sub-layer material of claim 3, wherein the textile fibers
have an average diameter of about 4 to 20 micrometers.

9. The laminate flooring sub-layer material of claim 3, wherein the textile fibers have an average diameter of about 5 to 16 micrometers.
10. The laminate flooring sub-layer material of claim 3, wherein the textile fibers have an average fiber length of about 1 to 15 cm.
11. The laminate flooring sub-layer material of claim 3, wherein the textile fibers have an average fiber length of about 2.5 to 10 cm.
12. The laminate flooring sub-layer material of claim 1, wherein the plastic-containing bonding fibers comprise bi-component fibers.
13. The laminate flooring sub-layer material of claim 12, wherein the bi-component fibers are sheath-core, side-by-side, island-in-the-sea, or segmented-pie cross-section type.
14. The laminate flooring sub-layer material of claim 12, wherein the bi-component fibers comprise:
 - a core material; and
 - a sheath material, wherein the sheath material has a melting point temperature lower than the melting point temperature of the core material.
15. The laminate flooring sub-layer material of claim 14, wherein the core material and the sheath material are both thermoplastic polymers.
16. The laminate flooring sub-layer material of claim 14, wherein the core material is a mineral and the sheath material is a thermoplastic polymer.
17. The laminate flooring sub-layer material of claim 14, wherein the core material and the sheath material are same thermoplastic polymer but of different formulations.

18. The laminate flooring sub-layer material of claim 1, wherein the plastic-containing bonding fibers comprise mono-component thermoplastic polymer fibers.
19. The laminate flooring sub-layer material of claim 1, wherein the plastic-containing bonding fibers are between about 5 to 50 wt. % of the laminate flooring sub-layer material.
20. The laminate flooring sub-layer material of claim 1, wherein said plastic-containing bonding fibers are between about 10 to 25 wt. % of the laminate flooring sub-layer material.
21. The laminate flooring sub-layer material of claim 1, wherein said laminate flooring sub-layer material has a gram weight of about 150 to 600 gm/m².
22. The laminate flooring sub-layer material of claim 1, wherein said laminate flooring sub-layer material has a density of about 48 to 200 kg/m³.
23. The laminate flooring sub-layer material of claim 1, wherein said laminate flooring sub-layer material has a density of about 80 to 112 kg/m³.
24. The laminate flooring sub-layer material of claim 1, wherein said laminate flooring sub-layer material after curing or heating has a thickness of about 2 to 8 mm.
25. A laminated sub-layer mat comprising:
 - a fiber composite mat having a first side and a second side, the fiber composite mat comprising:
 - inorganic fibers;
 - plastic-containing bonding fibers, said inorganic fibers and said plastic-containing bonding fibers being uniformly blended and bonded together by a portion of the plastic of said plastic-containing bonding fibers; and

a vapor barrier layer bonded to at least one of the two sides of the fiber composite mat.

26. The laminated sub-layer mat of claim 25, wherein the vapor barrier layer is polyethylene film, kraft paper, kraft paper coated with asphalt, foil, foil-backed paper, foil-backed paper coated with asphalt, or flame-resistant foil-scrim-kraft paper.

27. The laminated sub-layer mat of claim 25, wherein at least one edge of the vapor barrier layer extends beyond the corresponding edge of the fiber composite mat.

28. The laminated sub-layer mat of claim 25, wherein said inorganic fibers are scrap rotary fibers, virgin rotary fibers, scrap textile fibers, virgin textile fibers or a combination thereof.

29. The laminated sub-layer mat of claim 28, wherein the rotary fibers have average diameter not greater than about 6 micrometers.

30. The laminated sub-layer mat of claim 28, wherein the rotary fibers have average diameter of about 2 to 5 micrometers.

31. The laminated sub-layer mat of claim 28, wherein the rotary fibers have average fiber length not greater than about 3 cm.

32. The laminated sub-layer mat of claim 28, wherein the rotary fibers have average fiber length between about 0.2 to 1 cm.

33. The laminated sub-layer mat of claim 28, wherein the textile fibers have average diameter of about 4 to 20 micrometers.

34. The laminated sub-layer mat of claim 28, wherein the textile fibers have average diameter of about 5 to 16 micrometers.

35. The laminated sub-layer mat of claim 28, wherein the textile fibers have average fiber length of about 1 to 15 cm.
36. The laminated sub-layer mat of claim 28, wherein the textile fibers have average fiber length of about 2.5 to 10 cm.
37. The laminated sub-layer mat of claim 25, wherein said plastic-containing bonding fibers comprise bi-component fibers.
38. The laminated sub-layer mat of claim 37, wherein said bi-component fibers are sheath-core, side-by-side, island-in-the-sea, or segmented-pie cross-section type.
39. The laminated sub-layer mat of claim 37, wherein said bi-component fibers comprise:
- a core material; and
 - a sheath material, wherein said sheath material has a melting point temperature lower than the melting point temperature of the core material.
40. The laminated sub-layer mat of claim 39, wherein said core material and said sheath material are both thermoplastic polymers.
41. The laminated sub-layer mat of claim 39, wherein said core material is a mineral and said sheath material is a thermoplastic polymer.
42. The laminated sub-layer mat of claim 39, wherein said core material and said sheath material are same thermoplastic polymer but of different formulations.
43. The laminated sub-layer mat of claim 25, wherein said plastic-containing bonding fibers comprise mono-component thermoplastic polymer fibers.

44. The laminated sub-layer mat of claim 25, wherein said plastic-containing bonding fibers are between about 5 to 50 wt. % of the fiber composite mat.

45. The laminated sub-layer mat of claim 25, wherein said plastic-containing bonding fibers are between about 10 to 25 wt. % of the fiber composite mat.

46. The laminate sub-layer mat of claim 25, wherein said laminate sub-layer mat has a gram weight of about 150 to 600 gm/m².

47. The laminate sub-layer mat of claim 25, wherein said laminate sub-layer mat has a density of about 48 to 200 kg/m³.

48. The laminate sub-layer mat of claim 25, wherein said laminate sub-layer mat has a density of about 80 to 112 kg/m³.

49. The laminate sub-layer mat of claim 25, wherein said laminate sub-layer mat after curing or heating has a thickness of about 2 to 8 mm.

50. A floor structure comprising:
a supporting structural substrate;
a laminated sub-layer mat, wherein said laminated sub-layer mat comprises a fiber composite mat having a first side and a second side and a vapor barrier layer bonded to at least one of the two sides of the fiber composite mat; and
a finished floor layer in contact with the laminated sub-layer mat.

51. The floor structure of claim 50, wherein said fiber composite mat comprises:
inorganic fibers; and
plastic-containing bonding fibers, said inorganic fibers and said plastic-containing bonding fibers being uniformly blended and bonded together by a portion of the plastic of said plastic-containing bonding fibers.

52. A method of making a laminate sub-layer mat, comprising the steps of:
opening bulk inorganic fibers and bulk plastic-containing bonding fibers;
blending said opened inorganic fibers and said plastic-containing bonding fibers
into blended fibers;
forming said fiber blend into a mat having a first side and a second side;
applying a vapor barrier layer to at least one of said two sides of the mat; and
curing or heating said mat and said vapor barrier layer into said laminate sub-
layer mat.
53. The method of claim 52, wherein said inorganic fibers comprise glass fibers.
53. The method of claim 53, wherein said glass fibers comprise scrap rotary fibers,
virgin rotary fibers, scrap textile fibers, virgin textile fibers or a combination thereof.
55. The method of claim 52, wherein said step of opening further comprises a step of
weighing said opened fibers to monitor the feed rate of said opened fibers.
56. The method of claim 55, wherein said step of forming said fiber blend into said
mat further comprising continuously weighing said mat to ensure that the flow rate of the
blended fibers is at a desired rate.
57. The method of claim 56, further comprising a step of comparing the feed rate of
said opened fibers and the flow rate of said blended fibers in a feed back loop to control
the speed of said opening step.
58. The method of claim 52, wherein said curing or heating step comprises curing or
heating said mat at a temperature of less than about 220°C.